JPRS: 4900

18 August 1961

ALL-UNION CONFERENCE ON ULTRASONICS

by V. M. Patskevich

- USSR -

Distributed by:

OFFICE OF TECHNICAL SERVICES
U. S. DEPARTMENT OF COMMERCE
WASHINGTON 25, D. C.

U. S. JOINT PUBLICATIONS RESEARCH SERVICE
1636 CONNECTICUT AVE., N. W.
WASHINGTON 25, D. C.

F O R E W O R D

This publication was prepared under contract by the UNITED STATES JOINT PUBLICATIONS RESEARCH SERVICE, a federal government organization established to service the translation and research needs of the various government departments.

JPRS: 4900

CSO: 1879-S

ALL-UNION CONFERENCE ON ULTRASONICS

-USSR-

/Following is the translation of an article by V. M. Patskevich in Khimicheskaya promyshlennost' (Chemical Industry), No 1, Moscow, 1961, pages 72-73./

On 22-26 November 1960, the All-Union Scientific-Engineering Conference on the Application of Ultrasonics in Industry was held in Moscow. Attending the conference were 1600 delegates representing industry, scientific research and planning organizations, and sovnarkhozes. More than 130 reports and communications were presented at the conference.

The deputy chairman of the State Scientific-Engineering Committee of the Council of Ministers USSR, G. V. Aleksenko, opened the conference. In a short introduction he noted that the broad application of ultrasonics in industry is becoming one of the future scientific and engineering trends; the introduction of progressive methods and techniques employing ultrasonic engineering not only guarantees an increase in productivity but also, as a rule, increases the quality of the product. The leading Soviet scientist Academician A. I. Berg delivered a introductory address to the assemblage. Professor L. D. Rozenberg related new research in the area of physics as related to the industrial application of ultrasonics.

The following four surveys were next on the agenda: "The Present State and Trend of Development of the Technological Application of Ultrasonics in Mechanical Engineering" (Yu. I. Kitaygorodskiy); "Problems in the Industrial Utilization of Ultrasonics in Chemical Engineering Processes" (V. M. Fridman); "Problems in Producing Sources of Ultrasonic Energy" (D. B. Mondrus); "The Development of Methods and Techniques of Ultrasonic Inspection" (O. I. Babikov). The basic tenets of these reports were developed in detail in the corresponding four sections of the conference.

In the first section, on the application of ultrasound in mechanical engineering, there were heard and discussed a group of reports on problems such as the ultrasonic cleaning of various industrial components and parts; the acceleration of electrochemical processes; the ultrasonic welding and soldering of metals, glass, ceramics, and ferrites; the application of ultrasound to metallurgy; mechanical working using ultrasound; the ultrasonic welding of plastics; power grinding. An experiment in the use of ultrasound for these purposes was described It

was noted that the execution of certain processes by ultrasonic means turns out to be not only highly effective but the only way possible. It was shown in particular that such a welding technique for plastics ensures high performance and structural advantages, whereby superheating of the plastic is obviated; this method is more general than others being applied at present.

The reports of the second section, in the application of ultrasound in chemical engineering processes, were devoted mainly to such problems as ultrasonic dispersion and crystallization; the effect of ultrasound on chemical processes; coagulation of aerosols; the acceleration of drying processes; acoustic filtration and the inhibition of crystal formation. The application of ultrasound makes it possible to obtain highly disperse materials (mesh size of about 1/u), to accelerate the dispersion process, and to process materials which yield with difficulty under other kinds of processing.

In a report by L. I. Komdakova and V. M. Fridman, the fundamental laws of ultrasonic dispersion in practice and the necessary equipment for it were considered. In recent years in the USSR and abroad industry has begun to obtain high quality emulsions and suspensions by ultrasonic means.

In other reports an experiment in the application of ultrasound for the dispersion of various chemical substance in a number of plants and factories in the Soviet Union was presented along with results of recent laboratory investigations.

The study of the effect of ultrasound in crystallization processes and solutions are of great practical interest. Data on these investigations were presented in reports by A. P. Kapustin, Yu. N. Tyurin, and others. Ultrasound can become a new medium for the control and investigation of crystal-forming processes.

In a report by M. S. Akutin and others information was presented on investigations in the application of ultrasound for obtaining agglomerated and grafted polymers. This technique, along with the radiation method, makes it possible to obtain substances which are impossible to synthesize by the usual means.

A report by S. P. Kirichenko dealt with the problem of accelerating the thermal cracking process. It was shown that upon application of ultrasound the emission of gas and liquid reaction products increases considerably, whereupon the hydrocarbon composition of the benzene fractions shifts toward a decreased content of the unbound hydrocarbons.

Problems were also presented on the effect of ultrasound on the processes used in the electrolytic production of chemical substances and on the application of ultrasound for the hydrolysis of lignin, which improves its melting properties and greatly increases its thermal stability. One communication reported on experimentation in the application of ultrasound at the Lisichanskiy Chemical Combine. The results of the investigations into the effect of ultrasound on heterogeneous diffusion processes were given, and several practical recommendations were made. In another communication E. G. Tokar' presented the results of laboratory and semi-industrial experiments on the application

of ultrasound for accelerating the washing and drying of woolen materials. Problems in the application of ultrasound for washing fabrics, for increasing the juice yield of grapes (G. N. Gasyuk and others), and for accelerating photographic developing processes (M. E. Arkhangel'skiy) were considered.

In communications by B. F. Podoshevnikov, V. P. Kurkin, M. L. Varlamov, and others, an ultrasonic method for the coagulation of aerosols was presented. For instance, in ridding waste gases of fluorine compounds and oxides of nitrogen it is readily possible to lower their content to a sanitary norm. For example, by applying sound at a frequency of 16.5 kc and at a sound intensity level of 155 db for four seconds it is possible to increase the degree of fluorine precipitation from the 42-69% obtainable without the application of sound to 80-95%.

T. I. Mashkova and Yu. Ya. Vorisov presented a survey of experimental work on the acceleration of drying in an acoustic field and showed plans for acoustic dryers. The acoustical method makes it possible to dry out materials without a considerable increase in temperature, thus shortening the drying time.

Attention was also devoted to the problem of applying ultrasound for the purpose of avoiding scale formation in steam boilers and heat-exchange apparatus, and for the prevention of incrustation in industrial crystallizers.

In the reports and communications of the third section, on sources of ultrasonic energy, descriptions and technical parameters were given for various ultrasonic generators and for magnetostrictive piezoceramic, hydrodynamic, and aerodynamic radiators, both in regular production and in the developmental stage.

In the sessions of the fourth section, on ultrasonic control and measuring instruments, problems in the use of ultrasonic methods for the control and analysis of various technological processes were presented. Devices have now been developed which can be used in volatile media and highly combustible environments.

Ultrasonic devices based on measurements of the velocity and absorption of ultrasound in a given medium (liquid or gas) make it possible, with respect to the measurement of these values, to evaluate the variation of such physical-chemical parameters of the medium as density, viscosity, concentration, and the timewise behavior of the processes. Such a method, along with other currently well-known techniques of physical-chemical analysis (X-ray, radioactive, optical, and others), now permits the control of chemical production and the automation of many technological processes, either partially or completely. Ultrasonic viscosimeters, gas analyzers, flowmeters, and level gages, including devices for volatile liquids and pulp, as well as acoustic pressure and intensity gages were considered.

In conjunction with the third section, a discussion was held on "The Procedure for Measuring Acoustic Power Delivered to a Liquid by Transducers."

The conference demonstrated that in many branches of industry and research progressive ultrasonic methods make it possible to solve

a number of important problems of science and industry, and are promoting automation, increasing productivity, and improving the quality of the product.

Prior to the conference a list of the reports to be read in the various sections was printed. The materials of the plenary sessions and resolutions of the conference will be published later.

The participants of the conference visited a special exhibit of new types of ultrasonic devices and technological equipment in the Mechanical Engineering Pavilion of the Exposition of Achievements in the National Economy of the USSR.

-END-